THE

VETERINARY JOURNAL

Editor :

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JUNE, 1917.

Editorial.

OUR RESPONSE TO THE PRESSING NEED.

A.V.C.

VETERINARY SURGEONS under fifty years of age are most urgently needed for Temporary Commissions in the Army Veterinary Corps for service at home and overseas.—For particulars apply to Director-General Army Veterinary Service, 16, Victoria Street, London, S.W.

Again and again, in accordance with the habits of our voluntary system, the above advertisement appears in all our professional journals. Now that the younger men have gone the older ones *must*, in their turn, step into the breach.

England needs them, or she would not ask for them; and have them she must, by hook or by crook. It is in accordance with our old belief that "one volunteer is worth two pressed men," that the game has been allowed to go on so long, in our department as well as in others of our citizen army, but if the voluntary system cannot supply the pressing need, the methods of the press gang must be put into force.

The fact of the age limit being raised to 50 demonstrates beyond question the fact that our supply of veterinary officers is strained to the uttermost—or is it that we have not been loyal enough and willing, each in his turn, to sacrifice something for the Motherland?

It is, of course, possible that even yet in some parts of Great Britain and Ireland it is not realised that a war is on, and, judging from the conversations of some who return from leave this belief is justifiable. Certainly until a year ago this thought was often present

and much discussed. "Under 50" means that men of mature judgment can have positions found for them in which their services to the nation are of the greatest value. In hospitals, in remount depots, on transport and other special work, where dozens of professional men are needed, they can vie with the younger man in doing good work, and set him free to take the great physical hardships for which he is better fitted.

"*Most* urgently needed" is not an expression which would be used by such a proud body as the War Office without reason, and that the need *is* there should be taken for granted in consequence.

The need *is* there, England's pressing need, and it is not for us to count the cost to ourselves personally. Pride in being physically able to obey should be the dominating feeling of everyone, and, given the officers to work with, it remains but for the "powers that be" to distribute them sensibly and usefully to the best advantage. France and Germany have not had so much patience with the profession, and England can't afford to wait much longer. If voluntary measures fail, then pressure *must* be brought to bear.

INTERMEDIARY AGENCIES IN THE SPREAD OF CONTAGIOUS DISEASES.

It is well known that contagious diseases are spread by intermediary agencies quite as readily as by actual, direct contact, and it is not always easy to trace up the transmitting agent.

It is not necessary, in order to keep a disease in a stable, for the transmitting agent to be a horse only, a man can carry it from place to place, and stall to stall.

One does not always, however, think to associate mice and rats with the spread of mange, as they are not animals to which a horse takes naturally,; but a case detailed by a correspondent in this month's number clearly proves that mice can catch horse mange, and there is no doubt that mice and rats are responsible for the prolonged period over which some stables will be infected.

In fact, owners of large studs of horses, especially contractors, have often stated that the only way to get rid of mange from a stable is to burn the place down.

One authenticated observation, whether clinical, bacteriological, or of any other branch of veterinary science, is worth a thousand theories, and practitioners who will take the trouble to record their experiences and clinical observations are performing a service to their fellow members (especially the young and inexperienced ones) and conferring a boon which helps to establish self-confidence, and so to help forward the progress of the profession to which our lives are devoted.

PLATE I.

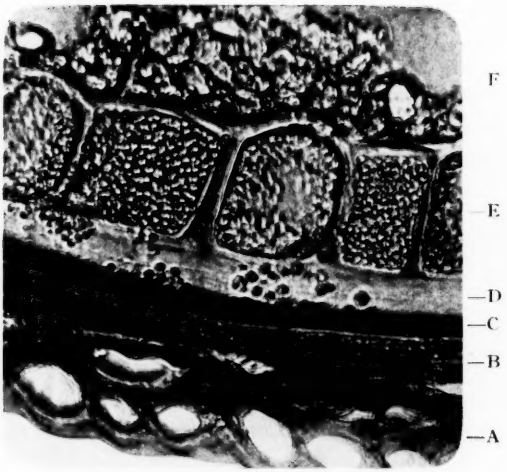
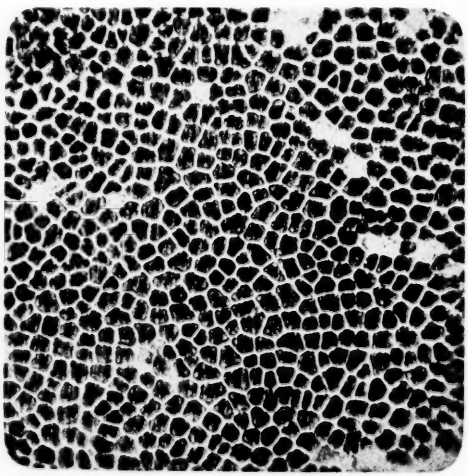


FIG. 1.—Cross section through wheat bran.
A.—B. Pericarp. C. Spermoderm, pigmented
D. Perisperm or hyaline layer, showing some displaced cell contents from the vitamine layer.
E. "Aleurone" or vitamine layer of endosperm.
F. Adherent starch grains of endosperm.
× 400.



Wheat Bran.
FIG. 2.—Surface view of vitamine layer.
× 75.

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Original Communications.

THE DIETETIC VALUE OF WHEAT BRAN.

By R. G. LINTON, M.R.C.V.S., Professor of Hygiene, and W. S. PETRIE,
Royal (Dick) Veterinary College, Edinburgh.

THE wheat grain consists of an outer skin or pericarp, a germ, and an endosperm. The germ or embryo plant forms about 1·5 per cent. of the entire grain, and is rich in protein and oil. It is removed in the milling process, as the oil becomes rancid in stored flour, and as a by-product is sold as food for pigs and cattle, or is made into proprietary anti-diabetic foods for human consumption.

The endosperm forms the bulk of the kernel and accounts for about 92 per cent. of the whole grain. Originally intended merely as the food-store for the embryo plant, it has been increased in size by selective growth. It is composed of a network of parenchymatous cells containing gluten and starch grains. On its surface is a layer of thick-walled cells, which are densely packed with protein or "aleurone" grains (Fig. 1); each cell contains a single large nucleus which is rich in organic phosphate.

This layer of cells has been named the "cerealine," "gluten" or "aleurone" layer. Owing to the fact that the vitamines are largely located here, Johnson (1) suggests that this most important cell layer be called the *vitamine layer* in preference to the older names, which are misnomers. This single layer of cells is, as Professor Johnson says, "the richest part of the whole food-bag."

The skin or pericarp consists of 6–8 rows of cells (Fig. 1), two of which are pigmented and give to bran its distinctive colour. The cells are exceptionally tough, and therefore resist digestive processes.

In the milling of wheat the cleaned grains are passed between a series of paired rollers, which break the grain into pieces, flatten out the germ, tear off the pericarp, and finally grind the broken grain into flour. During the milling process, and after each "break," the crushed grain, skin, and germ are separated by sieving.

Although the vitamine layer is a part of the endosperm, in ordinary milling, even with modern machinery, it is not possible to remove the pericarp without taking with it this valuable layer. Thus "bran" consists of the tough pericarp plus the richest part of the food-bag, the vitamine layer. It is to the presence of this vitamine layer that bran owes its unquestionable dietetic value.

The object of the miller is to remove the skin of the wheat with as little flour adherent as possible, and the present-day bran, the first offal to be removed, has very little starch attached to it when produced in a modern mill.

As the grains are broken and the bran is removed, portions of the

latter remain adherent to the endosperm, and are subjected to further grinding and sifting, and are separated, together with an amount of adherent flour, as sharps or pollards, a finer offal than bran. Further grinding and sifting separate in turn coarse middlings, or fine sharps, and the fine middlings. (The grading and naming of wheat offals are very confusing; for elucidation readers are referred to the *Journal of the Board of Agriculture*, March, 1917.) In passing it may be mentioned that 11 per cent. of the wheat offal is now included in the Government Regulation Flour, so that the percentage of flour obtained from the entire grain is increased from 70 per cent. to 81 per cent., and to which is now added 5 per cent. of maize, beans, or rice. The addition of beans would be the most beneficial from the point of view of increasing the dietetic value of bread.

In rejecting the germ and the bran, the miller, as Hutchison says (2), "discards some of the most useful chemical constituents of the wheat, for with the germ protein and fat are lost, and with the bran, mineral matter and the protein contained in its layer of aleurone cells." The bran is removed because it is a difficult matter to grind it sufficiently small for human digestion to be effective. It is well known that wholemeal bread, which contains the bran, is less readily absorbed by people than is ordinary white bread from which the bran has been separated. The exceptionally tough cellulose is not only itself indigestible, but is credited with retarding the digestion of the starch with which it is mixed. Hutchison says (2) that Giraud has demonstrated unchanged "aleurone" cells in the human excreta, and the same author quotes Rubner's statement that only one-third of the nutriment contained in bran is capable of being made use of by the human digestive organs.

The question then arises: What is the dietetic value of wheat bran to animals? That those who are associated with the feeding of animals are not of one mind as to the nutritive properties of bran is evident. Agriculturists, or rather those agriculturists who are interested in animal nutrition, have accepted Kellner's assessment, which is that 1·36 lb. of wheat bran is equivalent to 1 lb. of oats for the purpose of producing bodily increase in mature oxen. If proof were needed that Kellner's valuation is not too high, it is to be found in the results of the two experiments conducted by Bruce (3, 4), which will presently be reviewed.

Though agriculturists have freely accepted Kellner's valuation many veterinary practitioners refuse to do so, and condemn bran in no uncertain tones. Most emphatic in this condemnation among British veterinary writers is Smith (5), who goes so far as to say that "as a food it is useless, in spite of its chemical composition," and

again, " bearing in mind that it (bran) has no nutritive properties, the interior should not be burdened with it unnecessarily." Even as late as 1912 he evidently saw no reason to modify his views (6). It is evident that Smith's dictum has been responsible for much misunderstanding as to the real nutritive value of bran, and many have accepted his teaching without themselves considering its validity.

Opinions as to the food value of this wheat offal are obviously at variance. While some claim for it a value in excess of its true worth, others decline to admit that it has any real nutritive properties.

Some idea of the magnitude of the interests involved may be gathered from the figures published by the Board of Agriculture and Fisheries (7), showing the quantity of wheat offals produced in Great Britain.* In 1907 the amount of all wheat offals is given as 35,441,000 cwt., of which only a small proportion was exported. The increase of consumption of wheat offals in Great Britain since the declaration of war is shown from the following figures. The exports of bran and pollards for the twelve months preceding August, 1914, were 2,294,750 cwt. and of sharps and middlings 95,333 cwt. The exports for 1915 were: Bran and pollards, 53,000 cwt., and sharps and middlings, 11,000 cwt. As the home production of wheat offals (prior to the flour regulation) has probably not varied more than 1 per cent. to 2 per cent. either up or down since 1914, it may be assumed that approximately an additional 2,326,000 cwt. of wheat offals are now consumed in this country.

Wheat bran has the following percentage chemical analysis: Crude protein, 14; fat, 4; carbohydrates, 55; crude fibre, 10; and ash, 5. On its analysis one might expect that the dynamic value of bran would be about 7 per cent. less than that of oats, but Kellner has shown (8) that the production value of such by-products is considerably less than one would suppose from a mere examination of their analysis, and he therefore gives to bran a " value number " of 77, as compared with one of 95 for oats.

The production starch equivalent of bran, according to Kellner's theory, is about 30 per cent. less than that of oats when fed to cattle. Owing to the character of the cellulose it is not improbable that bacterial decomposition to a certain extent replaces true digestion, and it may be expected that bran gives the best results when fed to animals having relatively high cellulose digestive powers. Thus, as nutriment for fattening swine, bran has not been found to be satisfactory. The modern pig requires food which is rapidly digested, and, like human beings, has little power to digest cellulose. On the other

* For assistance in obtaining this information we are indebted to the Board of Agriculture for Scotland.

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hand, the finer wheat offals give good returns. Bran is more suitable for brood sows than for fattening pigs, but, if fed continuously, lime in some form should be given with it.

In 1911–1912 Bruce (3) tested the increased production value of medium wheat bran. Twenty-eight 2-year-old bullocks were given a basal ration of 90 lb. turnips, 12 lb. oat straw, and 4 lb. cotton cake; to half of the cattle were given 4 lb. linseed cake per head daily, and to the other half an average of 4·7 lb. medium wheat bran per head daily. The bran was fed dry. At the termination of the experiment, which lasted 112 days, it was found that the linseed-cake-fed lot had gained an average of 2·25 lb., and the bran-fed lot an average of 2·02 lb. per head daily. The bran-fed lot received, according to Kellner's method of valuation, ·8 lb. P.S.E. less per head daily than those on linseed cake. In 1912–1913 Bruce (4) conducted a further experiment in which linseed cake and bran again figured as two of the food-stuffs tested. As an addition to the basal ration one lot of cattle received 3·95 lb. linseed cake daily per head, and another lot 5 lb. of bran. The average daily gain for the cake-fed bullocks was 2·033 lb., and for the bran-fed cattle 2·009 lb. per head. The increase was, therefore, practically identical. The bran-fed cattle received ·49 lb. P.S.E. less per day than did the cake-fed animals. Bruce, therefore, shows that wheat bran, for the purpose of fattening cattle, has a slightly higher value than has been ascribed to it by Kellner.

As a concentrate for milch cows bran is held in high esteem. The slight laxative effect which it has, together with its protein and phosphoric acid content, make it eminently suitable for this class of animal. As cows continue to excrete calcium in their milk, irrespective of the amount given in their food, bran should not form too large a proportion of the daily ration unless it is combined with foods rich in lime, such as bean meal for a concentrate, or a leguminous straw for roughage. Any bad effects of continuously giving to cows food containing a low proportion of calcium may not be readily apparent, but a constant drain of calcium from the system could not fail to have deleterious effects upon the offspring. Such nutritional deficiency would be shown in physical deterioration, and a lessened resistance to disease. The possible connection between calcium deficiency and tuberculosis has been hinted at.

Bran has never been used extensively for the feeding of horses in this country, and it is chiefly given for its laxative effect, or because, owing to its light, chaffy nature, when mixed with oats, it prevents horses from bolting this grain. Bran in the form of a mash is a favourite diet for sick horses, for which purpose Smith recommends it. Its laxative effect is here beneficial, and fresh bran when steamed

gives off an appetising odour which is tempting to a delicate palate. Moist, steamed food is appreciated by fevered animals, and is more suitable for them than dry food. Nevertheless, all scalded food is less digestible than dry food, and the nitrogenous constituents of bran are 7 per cent. less digestible when steamed than when dry.

Henry and Morrison (9) consider bran a useful food for the horse, provided that, owing to its bulky nature, the amount is limited for hard-worked horses. They consider that, when low in price, bran may be profitably fed in larger amounts as a partial substitute for oats.

Feeding trials of bran with horses have been carried out by Burket (10) and by Shepperd (11). Burket fed two working horses a ration of 7 lb. oats, 7 lb. maize, and 12 lb. timothy hay, while with two other horses 7 lb. of bran replaced the oats. After repeating his trial Burket concluded that when given in this combination bran can replace an equal quantity of oats.

Shepperd in 1894 tested the feeding value of oats against equal parts of bran and shorts (ground grain sifted finer than bran) for working horses. Prairie hay was given for roughage. Eight working horses and four mules were utilised, and a careful record was kept of the number of hours each animal worked. Shepperd's report shows that there was little difference between the two rations, and he concluded that equal parts of bran and shorts, weight for weight, is nearly equal to oats for working horses.

It is difficult to assess the nutritive value of the shorts used in this test, as no analyses of the foods are given, and the composition of "shorts" is variable. It is probable that the starch equivalent of the combination is about 10 per cent. less than that of oats.

During a period of fifteen consecutive months the Cleansing Department of the City of Edinburgh Corporation tested the value of wheat bran as a substitute for a portion of the ordinary feeding. To Mr. John Gibson, Inspector of the City Cleansing Department, we are indebted for kindly placing at our disposal all the records connected with the trial. Twenty-nine horses were used for the test, but as some of these were fresh purchases and showed an increase of weight during the period out of proportion to the mature animals, and some were resting for varying periods for lameness or for other causes, we have utilised only the records of twenty mature horses, which worked throughout the entire period. Eleven of the animals were on the "bran ration" and nine on the "ordinary ration." The ordinary feeding was not the same throughout the whole period. For the first eight months ration "A" was given; that is, from the beginning of February, 1913, to the end of September, 1913, when ration "B" was substituted up to the end of the test in April, 1914. Though the

horses naturally received less food on Sundays, we have taken the daily ration as one-seventh of the total weekly ration, as follows :—

Special Feeding.		Ordinary "A."		Ordinary "B."	
Hay	13·4 lb.	Hay	14 lb.	Hay	16 lb.
Oat straw	3·85	Oat straw	4	Oat straw	5
Bran	8·5	Bran	2	Bran	2
Oats	8·5	Oats	8·75	Oats	10·2
		Beans	2	Beans	2·1
		Maize	1·6		

It will be seen that 6·5 lb. bran replaced a certain quantity of oats, maize, and beans.

The average weight of the eleven horses at the beginning of the test was 1,533 lb., requiring, therefore, 10 lb. of maintenance starch equivalent ; the average weight of the nine horses on the ordinary diet was 1,657 lb., requiring 10·6 lb. of maintenance starch equivalent.

In order to effect a comparison between the productive values of the two rations the maintenance portions of each must be stated separately, since the requirements for the two lots were different. To simplify comparison, the bran in the ordinary rations and an equal quantity in the special ration have been placed in the maintenance portion of the diet, thus leaving an additional 6·5 lb. of bran to be balanced against the foods given to the other lot of horses. The rations may be expressed as follows :—

Special Feeding— Foodstuffs.		Starch Equivalents. Maintenance.	Production.
Hay	13·4 lb.	6 lb.	—lb.
Oat straw ..	3·85	1	—
Bran	2·0	1·18	—
Oats	·75	·43	—
Bran	6·5	1·1	2·73
Oats	7·75	·46	4·50
		10·17 lb.	7·23 lb.
Ordinary "A"—			
Hay	14 lb.	6·3 lb.	—lb.
Oat straw ..	4	1·1	—
Bran	2	1·18	—
Oats	2·25	1·44	—
Beans	2	·20	1·3
Maize	1·6	—	1·23
Oats	6·5	·39	3·77
		10·6 lb.	6·3 lb.

Ordinary "B"—			
Hay	16 lb.	7·2 lb.	—lb.
Oat straw ..	5	1·35	—
Bran	2	1·18	—
Oats	10·20	·61	5·91
Beans	2·1	·21	1·38
		10·55 lb.	7·29 lb.

In the maintenance portion of each ration there is approximately 1 lb. of digestible protein.

Having satisfied the maintenance requirements as shown, the surplus nutrients available for work for each lot may be compared. The horses on the bran ration received ·44 lb. P.S.E. more per head daily than did those on the ordinary rations, a difference which is insignificant, and which does not materially alter the starch equivalent of bran.

After fifteen months the horses on the bran ration had increased in weight an average 8·95 lb. per head, while the average gain per head for the animals on the ordinary food was 16·8 lb. The weight increment for each lot is so small as to be negligible, and little importance can be attached to it, because an examination of the individual chart records shows that there was considerable fluctuation in weight throughout the period for each horse. The exclusion of any one animal might materially alter the relative gains. Indeed the degree of fluctuation is such as to leave one in doubt as to the value of feeding experiments on working horses where fine conclusions are drawn. So far as it is possible to estimate from a test of this character, where the animals are not worked in pairs or teams the work done was similar for each horse.

In the middle of April, 1913, six 6-year-old horses were added to this stud, and were put on the bran ration. Three of these animals worked the entire period of thirteen months, and three were rested at different times and for varying periods for minor ailments. The horses which worked without a break gained in the thirteen months an average of 205 lb. per head, or 16 lb. per month. It is not certain that these horses had reached their maximum of increment, as the chart records cease before this could be determined.

The broad results of this test are that all three rations were suitable for the horses for the work they had to do, inasmuch as the weight of the animals was the same at the end of fifteen months as at the beginning. According to the starch equivalent theory, the two lots of horses received practically the same amount of available nutriment, and one is justified in assuming that the fat production

value which Kellner gives to wheat bran also applies to the horse for the production of external work, though Kellner himself considers that "bran and feeding meals" are more suitable for fattening purposes than as food for working animals. The weight increment of the young horses, taking into consideration that they did continuous, though probably not hard work, is further evidence that Smith's opinion of the nutritive properties of bran is an erroneous one.

An example of heavy feeding and of a ration containing an unusually large amount of bran is furnished by a firm of millers. The average weight of the stud of nine horses is approximately 15 cwt. and one-seventh of the weekly ration is as follows: Cut hay, 5·7 lb.; long hay, 7·7 lb.; broad bran, 15·4 lb.; sport oats and barley, and small wheat, 17 lb.; and treacle, ·85 lb.

Allowing 11 lb. of starch equivalent for maintenance, containing a minimum of 1 lb. of digestible protein, the daily ration may be expressed thus:—

Foodstuff.		Starch Equivalents. Maintenance.	Production.
Hay	13·4 lb.	6·03 lb.	— lb.
Bran	5·0	2·95	—
"Oats"*.. ..	17·0	1·26	9·86
Bran	10·4	1·7	4·4
Treacle	·85	—	·4
		11·94 lb.	14·66 lb.

Since a minimum of 1 lb. of digestible protein must be included in the maintenance portion of the ration, in this particular diet there are allotted more heat units for thermic purposes than would appear necessary.

It will at once be apparent that this ration supplies an exceptionally large amount of nutriment, even for heavy horses doing very hard work. The dynamic portion will yield sufficient energy for 257,000,000 ft. tons of work. The oats, hay, and treacle, without any of the bran, will supply net energy capable of performing approximately 11,000,000 ft. tons of work, which is only about 200,000 ft. tons less than the maximum work which Smith considers horses are capable of doing (6). Other writers, however, place the maximum amount of work at 16,000,000 ft. tons, or even higher.

Even supposing that these horses expend the maximum amount of energy which is possible for horses of this class, there is still a

* For the analysis of this mixed food-stuff on which the starch equivalents are calculated we are indebted to Professor Gemmel, F.I.C.

balance of nutriment which will not be required for the performance of external work. It is, therefore, not possible to deduce the dynamic value of bran from the ration here given.

It may be added that the horses as one would expect, carry an abundance of flesh, and newly-purchased animals quickly gain in weight. The horses work well, pull heavy loads, and do not sweat at their work, or show any indication of softness. The veterinary attendant reports that their health is constantly good, and that digestive troubles are rare.

This ration provides convincing evidence that no harmful effects ensue from feeding to horses large quantities of bran.

It is of interest to know if the cell contents of the vitamine layer are digested to any extent in the small intestine of the horse, or if the bran particles are carried on to the large bowel before undergoing any marked change. Thanks to the courtesy of the Secretary and of the Superintendent of the Scottish Zoological Park, we were able to investigate this point.

Five horses, which were destined for slaughter, were fed 4 lb. of bran daily, in addition to coarse fodder. Each animal was killed at the end of 14 days, and portions of the visceral contents were removed for microscopical examination. Four of the horses had a final feed of 2 lb. of bran three hours before death, and the fifth eighteen hours previous to slaughter.

In each instance it was found that the cell contents had undergone considerable change in the initial portion of the small intestine. In the ileum, close to its junction with the cæcum, digestion was far advanced, many of the cells being quite empty. Nevertheless, a few particles of bran, apparently but little changed, were recovered from the cæcum of each horse, and occasionally similar fragments were found in the first portion of the colon. From the stomach of the horse which was killed 18 hours after its last feed, bran was recovered which showed remarkably little alteration. From this same animal fragments were found in the ileum and cæcum in much the same state as that found in the horses more recently fed.

It may be surmised that in each case the bran which was recovered from the ileum and large bowel had been there for at least eighteen hours, though that in the first part of the small bowel had probably found its way there after the morning feed, and had been lying in the stomach overnight.

It is interesting to note that, though it is not a difficult matter to separate the vitamine layer from the contiguous perisperm in the laboratory, the two remain adherent until the cæcum or, in some cases, the colon is reached.

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As a general statement, it may be said that once in the cæcum the vitamine layer is lost sight of, with the exception of some odd fragments of bran. The "aleurone" grains, to a large extent, disappear in the ileum, leaving their containing cell walls but slightly distorted, as is shown in Fig. 4.

It is generally accepted that, if bran is treated with boiling water and made into a mash, it has a laxative effect when fed to animals, and that, conversely, it has rather the opposite tendency when given in its natural dry state. For a long time it was thought that the laxative property was due to a supposed mechanical irritation of the flakes on the intestinal mucous membrane, and this opinion is still held by a number of people connected with the feeding of animals. It is difficult to understand how this idea originated, because histologically there is nothing suggestive of mechanical irritation. Bran possesses no real irritative properties, but where the amount of coarse fodder is insufficient to cause an optimum distention of the bowels—a rare condition in animals—large quantities of bran would mechanically supply the necessary stimulus, but not a stimulus due to "irritation." It is, furthermore, difficult to follow the reasoning which, attributing laxative property to mechanical irritation, says that when the irritating substance is fed dry it has, if anything, a soothing effect, and if fed moist after the cellulose has been softened with water, is irritating. This reasoning is inconsistent, and the admitted laxative effect of bran must be due to some other cause than mechanical irritation. Henry and Morrison (9), discussing the laxative effects of bran, refer to the finding by Hart and Patten (12) of an organic compound in bran containing phosphorus, magnesia, and potash—phytin—and mention its laxative property. Hart and Patten have shown that practically all the soluble phosphorus of wheat bran is of an organic nature, and that the organic compound exists in the bran as a magnesium-calcium-potassium-salt of a phospho-organic acid. The free acid corresponds to Posternak's phytic acid.

Jordan, Hart and Patten (13) have demonstrated that phytin can be completely, or almost completely, removed from bran by mere washing, but more easily by allowing the bran to undergo a slight acid fermentation, followed by leaching with water. Experimenting on two cows they proved that phytin has a definite laxative effect. They fed to a cow a ration containing 10 lb. of natural bran and when this was suddenly substituted by phytin-free bran the animal became seriously constipated and a purgative had to be administered. When the change from unwashed to washed bran was made gradually, there was no evidence of serious disturbance of health or appetite, but the fæces became darker in colour and drier. With the removal

PLATE II.

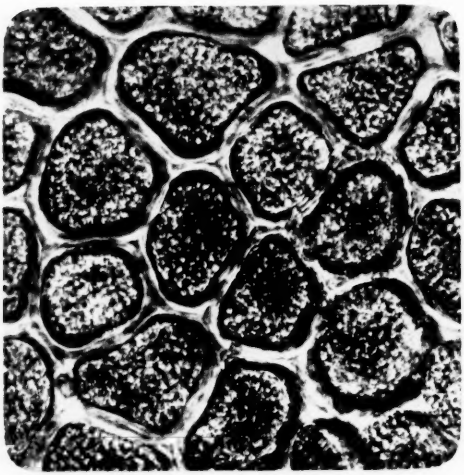

FIG. 3.—Surface view of vitamine layer.
Bran recovered from stomach 3 hours after ingestion.
× 400.

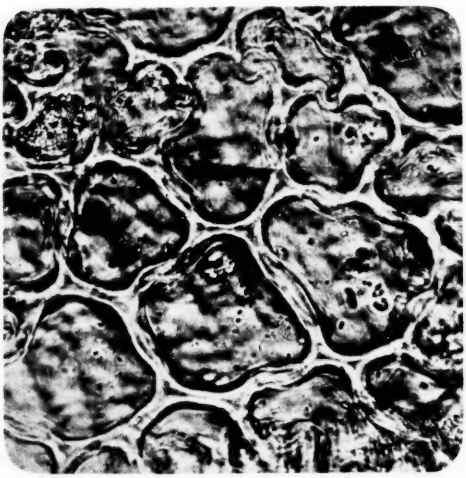

FIG. 4.—Surface view of vitamine layer.
Bran recovered from ileum 18 hours after ingestion.
Note the distorted and almost empty cells.
× 400.

[*To face page* 195.

of the phytin, the quantity of the urine was diminished, and it was also found that the leached bran was less digestible than natural bran. These investigators state that the laxative influence of phytin seems well established, as it did not appear probable that in washing the bran other compounds of a laxative nature were taken out. Leaching removes the greater portion of magnesium and potassium compounds, but very little of the calcium compounds, and after discussing the possible effects of the magnesium compounds, it is suggested that phytin exerts specific physiological influences.

The presence of phytin in bran was confirmed by Anderson in 1915 (14), who refers to the finding of the wheat enzyme "phytase" by Japanese workers (15), with confirmatory results by Plimmer (16). The enzyme rapidly hydrolyses phytin, with the formation of inosite and inorganic phosphoric acid.

Anderson demonstrates that the action of phytase upon phytin proceeds in several stages, and while only a portion of the phytin is completely decomposed into inosite and phosphoric acid, all the phytin is partially hydrolysed, with the formation of lower phosphoric esters of inosite and inorganic phosphoric acid.

Anderson further states that the formation of these intermediate products is only possible through the destruction of the enzyme before the hydrolysis is complete, and says that the reason for this inhibition is not clear, but that it may be due to the excess of phosphoric acid which is liberated, this presumably under laboratory conditions. The same writer also shows that the enzyme is destroyed by pouring boiling water on the bran, and one may therefore assume that a certain proportion of the enzyme would be rendered inert during the process of making an ordinary bran mash, and that if the hot mash be covered and the heat retained, the destruction of the enzyme would be more complete.

While it is obvious that the laxative property of wheat bran is intimately associated with the organic compound phytin, it would seem that further investigation would be profitable.

The so-called binding effect of dry bran does not in reality exist, and is only noticeable as a temporary phase when first given to animals having slight diarrhœa, when their water allowance is at the same time curtailed. Wheat bran absorbs three times its weight of water, and so would, under such a condition, still further reduce intestinal fluid, and cause the visceral contents to assume a firmer character.

The feeding of wheat bran in any appreciable quantity to horses has from time to time been blamed for causing two pathological conditions, the formation of intestinal calculi, and the appearance

of osteoporosis or Miller's disease. Both of these conditions are said to be connected with the mineral content of the bran. Bran contains about 6 per cent. of ash, which, according to Henry and Morrison, is composed as follows—the mineral content of oats from the same authority is given for comparison :—

	K_2O	Na_2O	CaO	MgO	Fe_2O_3	SO_3	P_2O_5	SiO_2	Cl
Bran ..	1·6	·24	·09	·73	·034	·67	2·95	·03	·09
Oats ..	·56	·23	·14	·20	·038	·49	·81	1·25	·07

Bran is rich in phosphorus and magnesium, and poor in calcium, and it is to the actual high percentage of phosphorus and relative low percentage of calcium that bran is credited with having baneful effects upon the system.

For many years veterinary writers have stated that wheat bran causes the formation of calculi in the intestines of horses fed largely on this offal. Smith (5) considers that the magnesium and phosphorus in bran is in an insoluble form, and that instead of passing out with the fæces, these salts become lodged in the bowel and ultimately coalesce to form a calculus. Smith admits the necessity for the presence of a foreign body, such as a nail or stone, to provide a nucleus around which the salts could become deposited, but goes on to say " that millers' horses had the reputation at one time of being very prone to intestinal calculi, through being fed on sweepings from the mill floor, with which were chips from the grinding stones ; the chief cause of their trouble was due to feeding on large quantities of bran, which is productive of calculi from the amount of insoluble salts it contains."

Wallis Hoare (17), discussing the etiology of true calculi, draws attention to the common presence of a large proportion of ammonio-magnesium-phosphate, and quotes Furstenberg's opinion that the phosphorus and magnesium are derived from the wheat bran, the feeding of which Furstenberg regards as predisposing to the formation of intestinal calculi. It is considered that the ammonia which is evolved in the intestines combines with the magnesium phosphate, precipitating the insoluble salt ammonio-magnesuim-phosphate. Wallis Hoare further says that, according to Cadeac, the conditions which determine the precipitation of these salts are not yet understood, and the etiology of intestinal calculi is still involved in uncertainty.

The same writer makes the statement that it is well known that millers' horses furnish more cases of intestinal calculi than those engaged in other work, and refers to the supposition that the real cause of the apparent more frequent occurrence of calculi among millers' horses is the inclusion of mill sweepings in the food. A. Rogerson is

quoted by this author as being the first to demonstrate that intestinal calculi are formed round a central nucleus, and that when Rogerson had the oats freed from foreign bodies, such as nails, all causes of calculus formation ceased.

To state that the formation of intestinal calculi is mainly attributable to the free feeding of bran, as Smith does, is to saddle a useful and safe feeding stuff with a fault that it does not possess.

The fault lies, not in feeding foods either actually or relatively rich in certain salts, but in giving that food in a dirty state. Whatever may have been the incidence of calculi among millers' horses at some previous time they are now no more liable to this serious complaint than are the animals owned by other people. If it is true that millers' horses furnished more cases of this trouble than other animals, it must have been due, as has been suggested, to the wheat offal given them being particularly contaminated with grindings from the old-fashioned millstones, and with dirt from the floor sweepings.

It must not be forgotten that the introduction of steel rollers, now in general use in the larger mills, is of comparatively recent origin, and the process of washing wheat is still more recent. It is not improbable that the washing of wheat combined with the elimination of the stone roller reflects largely on the present-day comparative immunity of horses from intestinal calculi. What the incidence of calculi is among horses fed largely on bran obtained by the old method of milling we do not know, but it is common knowledge that intestinal calculus is to-day a rare disease, and at the same time the consumption of wheat bran has increased of late, and especially so during the last three years.

That millers' horses need not suffer from calculus formation even though fed on exceptionally large quantities of bran is shown by the record of the horses referred to on page 192. During the past five years the stud of nine animals have had a daily ration of about 15 lb. of bran per head; for the eighteen years previous each horse received not less than 5 lb. of bran daily. In this period of 23 years one horse died as the result of true calculus formation and this animal has only been on the premises for twelve months.

There is no evidence, either clinical or experimental, to show that wheat bran is the cause of calculus formation, either in the horse or other animal.

A constant supply of mineral substances to the body is necessary for the mature animal as well as for the growing young. Growing animals require and retain a relatively greater amount than do mature animals, in order to meet the need of enlarging structures. With

animals of all ages there is a constant outgo of mineral matter, the result of metabolic processes, and if the supply be kept short of physiological requirements for any length of time, pathological symptoms, such as muscular weakness and nervous disorders, appear.

It is said that (8) death occurs sooner under these circumstances than if no food had been given at all. A deficient supply of calcium or phosphorus compels the animal to draw the requisite amount for physiological purposes from its skeleton, thus leaving the bones in a brittle state. Hart, MacCollum and Humphry (18) fed a cow for 110 days a ration lacking lime. She gave out in milk, dung, and urine, twice as much calcium as she took in in her food; during this period she gave up about 25 per cent. of the lime in her bones.

Of equal importance to the actual quantitative supply is the relative proportion of the salts taken in by the body from the food. Excess of acidity in the food calls for a corresponding liberation of calcium as a neutraliser with consequent calcium deficiency to the tissues which in turn draw upon the bones for their necessary supply, to the detriment of the latter. It is sometimes stated that animals fed liberally upon wheat bran, a foodstuff which is rich in phosphorus and relatively poor in calcium, develop "bran disease" or the so-called millers' horse rickets. Ingle in 1907 (19) attributed the enzootic osteoporosis met with in the Transvaal to rations not necessarily deficient in lime and phosphates, but in which the ratio of the lime to the phosphoric acid is too low.

H. B. Elliott (20), discussing the outbreaks of osteoporosis in Hawaii, shows that the evidence for and against the hypothesis that wheat bran was the cause of the trouble was conflicting, and from his review of the etiological position we must admit that with these particular outbreaks of the disease, nutritional deficiency, or an unbalanced mineral supply could not be held responsible.

So far as the writers know, there is no evidence that gross osteal changes are found in animals in this country in any way attributable to feeding bran or any other food having an unbalanced mineral content. Nevertheless, experimental feeding shows us that harmful results can ensue, and it is advisable for stock-keepers to keep this in mind. Authoritative writers consider that bran is an excellent food, and recommend its use for brood mares and young stock, but with the proviso that lime in some form be added. The practice of giving flaked maize and wheat bran to ewes and lambs, which has been common this spring, is hardly commendable unless the caution above mentioned is heeded.

There need no longer be any query as to the production value of bran for cattle. Bruce has shown that Kellner's opinion is not too

high, and the Scandinavians consider bran equal to oats, weight for weight (21). It is here suggested that Kellner's increase production value also applies to horses for work production, and that if purchased with a view to economical feeding, 1·36 lb. of bran is equal to 1 lb. of oats. For working horses, except possibly farm horses, food-stuffs must be considered on either their thermic or dynamic worth. Purchase on " food units " is misleading.

The chief use of bran for horses would be for those unthrifty, weedy colts, which have mainly subsisted on fibrous dead grasses deficient in vitamines, and excellent results may be looked for if the bran is fresh, and is fed in conjunction with a leguminous straw or inorganic calcium.

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THE INTRADERMAL PALPEBRAL MALLEIN TEST FOR GLANDERS.

By Captain R. P. HOLMES, M.R.C.V.S., D.V.S.M. (Vict.), N.D.A.
Army Veterinary Corps.

This method of applying the mallein test to horses and mules is being carried out on an extensive scale during the present war, and has now become almost universally recognised as the quickest and most convenient method of testing where a large number of animals have to be dealt with; and from my own personal observation and experience in testing many thousands of horses and mules, I am thoroughly convinced that when carefully carried out it is the best method, for on more than one occasion it has proved itself a more delicate test than the usual method of hypodermic injection with the ordinary mallein in the neck.

Apparatus Required for Carrying out the Test in the Field.

In carrying out the test one is not always in a position to have a small laboratory close at hand for the sterilisation of syringes, needles, etc., and replacement or repair of breakages which may occur during the period of testing, and although this is convenient, it is not essential. The greater part of my experience in applying this test has been at a Field Veterinary Hospital, where I have endeavoured as far as possible to produce an appliance for field work which could be most easily carried about from place to place as required during testing. The first thing to be considered is an appliance for the sterilisation of the syringes and needles. A good spirit lamp should be obtained, in which the flame can be regulated by an adjustment screw. This is placed inside a clean, deep bucket so as to protect it from draughts, and a small pan, holding about one pint of water is placed on a stand attached to the upper part of the lamp. The lamp is lighted, and the water heated to boiling point, when the syringes and needles with spare parts are placed in the water for sterilisation, after which the flame of the lamp is regulated so as to keep the water just at boiling point in order that the syringes and needles may be sterilised during the period of testing. In addition to the above apparatus two syringes are required. I have found it always better to work with two syringes, so that while one is being used the other can be sterilised and filled with mallein. It is also advisable to carry a few spare parts of a syringe, or, even better, a spare syringe, and at least six new needles to allow for breakages, especially if a large number of animals are to be malleined.

It is important that syringes and needles of the best quality and those most suitably adapted for the test, should be used. Many

different kind of syringes have been submitted to me for test as to their suitability for the intradermal palpebral mallein test, but the only one which has given me complete satisfaction is the Straus-Collin pattern. It has proved reliable in adjustment, strong and durable, The piston-rod of this syringe is circular in section, spirally grooved, and graduated, and carries a small movable wheel by which the dose of mallein can be regulated. The syringe holds 1 c.c. of mallein (17 minims), and the dose of mallein dilue (1 in 4) being 2 minims, it is obvious that when the syringe is completely filled it contains sufficient to mallein eight horses.

The needles and syringes should be carefully examined for any defects before testing is commenced. The fine point of the needle requires the same protection as the edge of a razor; if it is broken off, or turned up in the slightest degree, the needle is rendered useless, and should be immediately replaced.

The free portion of the needle of the Collin syringe is $\frac{5}{8}$ inch long, and this may be considered as the most convenient length. I have tried needles 1 inch and $1\frac{1}{2}$ inches in length, and find them very clumsy to work with and difficult to manipulate between the layers of the palpebral membrane, consequently by using them one is more likely to introduce a dose of mallein hypodermically.

Method of Applying the Intradermal Palpebral Mallein Test.

The left eye is the one usually selected for applying the test. The selection of the area on the palpebral membrane for carrying out the test is of great importance. The most convenient place is midway between the outer and inner canthus of the eye, and not more than $\frac{1}{8}$ inch below the edge of the lower eyelid. This area is devoid of hairs and can be most easily made tense, a condition which facilitates the entrance of the needle, and also enables one to regulate the depth of the needle when inserted horizontally, so as to keep it between the layers of the palpebral membrane when the dose of mallein is being injected. It will thus be observed that great care is necessary in carrying out the test in order to ensure that each dose of mallein is injected intradermally. It is important that the animal should hold its head perfectly still while the injection is being made, and although some animals of a quiet disposition can be malleined without being secured, or even by grasping the right ear with the hand, I have found it the quickest and most convenient method to apply a twitch to the right ear in each case, especially when a large number of strange animals have to be malleined. When the above precautions are taken in securing the animals it is possible in every case to inject the dose of

mallein intradermally. There are, however, exceptions, when one occasionally meets with a horse or mule which is so restless and difficult to secure that one feels doubtful when the injection is made whether the dose of mallein has been introduced intradermally or hypodermically. The proportion of these animals is, however, comparatively small, and although a reaction will be given, the reaction is more marked with intradermal than hypodermic injections. I make the latter statement from actual experimental observation.

CHANGES TO BE OBSERVED IN THE EYE OF A NON-REACTER.

Within the first six hours after the injection has been made there are certain changes which take place in the eye of a non-reacter which have been found in some instances to cause grave alarm to those who are not thoroughly acquainted with the peculiarities of the test. Within an hour of testing, a slight, longitudinal oval swelling will be observed at the seat of the injection ; this initial swelling in some animals only attains the size of a pea or broad bean, whilst in others it assumes enormous proportions, extending literally to the outer and inner canthus and downwards as far as the zygomatic ridge, and in some instances closes up the eye. The swelling increases in size, and attains its maximum about the eighth hour, after which in a non-reacter it rapidly diminishes in size, and will have almost completely disappeared by the eighteenth hour, and should have totally disappeared at the end of twenty-four hours. During this period a slight watery or viscid discharge will be observed from the eye, and in some cases I have noticed a slight catarrhal discharge issuing from the inner canthus. The swelling is usually sensitive to the touch, but not so painful as in the case of a reacter.

CHANGES TO BE OBSERVED IN THE EYE OF A REACTER.

In the early stages the changes are similar to those of a non-reacter, but in the case of a glandered horse the initial swelling always persists for an indefinite period beyond the eighteenth hour, and generally from two to four days, though I have a case on record in which the eye swelling had not completely disappeared at the end of five days. The swelling is extremely painful to the touch, but its outline is not so well defined as the initial swelling of a non-reacter. There is almost invariably a thick viscid catarrhal discharge from the eye, chiefly from the inner canthus, which adheres to the sides of the face and fringes of the eyelids, often causing their complete closure.

The swelling usually takes the form of a triangular projection downwards and forwards towards the lower extremity of the zygomatic ridge, and in some cases the whole of the side of the face becomes swollen.

Temperature Reaction.

In carrying out the intradermal palpebral mallein test, it is not usual to take temperatures, though it is interesting and important to note that should it be desired to take temperatures, this must be commenced at an earlier hour than is usual with the ordinary hypodermic test in the neck. As a rule the highest temperature is to be found at, or about, the ninth hour, after which the temperature gradually subsides.

Confirmatory Test.

When a reaction is given to the intradermal palpebral mallein test, it is sometimes advisable, though not essential, to follow it up with a second test within forty-eight hours. This may be carried out on the opposite eye, or a hypodermic injection of 1 c.c. of the ordinary mallein may be given in the neck, when, if a definite combined reaction is obtained in both eyes, or in one eye and the neck, it may be taken as sufficient evidence alone (apart from temperature reaction) to confirm the diagnosis of glanders.

The following is a record taken of two cases which gave a definite combined reaction in the left eye and the left side of the neck :—

Case 1.—Subject, bay gelding (mule) 7 years old, animal in good condition. Inoculated (eye-test) January 2nd, 3 p.m.

January 3rd, 10 a.m. Lower eyelid swollen and extremely painful, the swelling extending downwards as far as the zygomatic ridge. The eye was partly closed, and a slight catarrhal discharge was observed to accumulate at the inner canthus. The mule was tested in the neck with 1 c.c. of ordinary mallein.

January 4th. Lower eyelid still swollen and painful, and the discharge increased and adhering to the side of the face. There was a swelling in the neck 5 ins. long, somewhat doughy in nature, but not very painful.

January 5th. Eye swelling persistent, still painful. The neck swelling slightly increased, and more painful than on the previous day. The mule was destroyed on January 5th, and *post mortem* examination revealed glanders nodules in both lungs. The trachea, larynx, and septum nasi were apparently free from lesions.

Case 2.—Subject, brown mare (H.D.) 10 years old. Animal in fair condition. Clinical symptoms. The submaxillary glands were enlarged and the left gland partially adhered to the side of the jaw. There was a thick, catarrhal discharge from both nostrils, and numerous large and small ulcers were found on the inside of the off hind leg, extending over an area from above the hock downwards to the side of the fetlock joint. Inoculated (eye-test) January 16th, 3 p.m.

January 17th, 10 a.m. Lower eyelid considerably swollen, extending from the outer and inner canthus as a triangular projection downwards and forwards to the zygomatic ridge. The eye was partially closed and extremely painful to the touch, and a slight catarrhal discharge was observed, which adhered to the free edges of the eyelids. Tested in the neck with 1 c.c. of ordinary mallein.

January 18th. Eye-swelling increased in size and extending downwards to the lower extremity of the zygomatic ridge, the eye was completely closed. The catarrhal discharge was increased, and of a pale yellow colour, somewhat viscid in character and adhering to the side of the face. There was a swelling in the neck about 4 ins. long, slightly painful on palpation.

January 19th. Eye-swelling much reduced in size, but still very painful. Swelling on the neck increased in dimensions and somewhat doughy in nature; greater pain is evinced on palpation than on the previous day.

This horse was destroyed, and *post mortem* examination revealed numerous large and small glanders nodules in various stages of development in both lungs. There were no lesions in the trachea, larynx, and lower two-thirds of the septum nasi, but on the upper third of the septum and on both sides of it were found several shallow erosions and a few definite glanders ulcers.

Although in the majority of cases where horses and mules have been tested and found to be affected with glanders a definite reaction has been obtained in both the eye and the neck as a combined test, there are a few exceptions. I have two horses on record in which a definite reaction was obtained with the intradermal palpebral mallein test, and no reaction whatever was given to a subsequent hypodermic injection of 1 c.c. of the ordinary mallein in the neck. These animals were destroyed as a result of the eye-test reaction, and found on *post mortem* examination to be affected with glanders. The particulars of the test, with nature of the reaction, and *post-mortem* appearances, in one of these animals is given herewith in detail:—

Subject, bay mare (rider) 12 years old. The animal was in rather poor condition.

Clinical symptoms: The submaxillary glands were enlarged and pain was evinced on palpation; no lesions were observed on the lower part of the septum nasi, and there was no discharge from the nostrils.

The horse was inoculated (eye-test) February 2nd, 3 p.m.

February 3rd, 10 a.m. The lower eyelid was swollen, tense and painful; there was a slight, catarrhal discharge of a pale yellow colour from the inner canthus, and the eye was almost closed. Tested in the neck with 1 c.c. of the ordinary mallein.

February 4th.—The eye-swelling was slightly reduced in size, but still very sensitive; a slight viscid catarrhal discharge was observed along the edges of the eyelids. There was no swelling in the neck.

February 5th.—The eye-swelling persists, but is considerably reduced in size, and not so painful as on the previous day. There was still no swelling on the neck.

The eye-swelling had not completely disappeared on February 6th, when the animal was destroyed. This horse was destroyed as a result of the eye reaction alone. *Post mortem* examination revealed numerous glanders nodules, varying in size and at different stages of development, evenly distributed in both lungs. There were no lesions in the trachea and larynx, but a few glanders ulcers were found on the upper third of the septum nasi.

From the results of the above test, which are taken from actual observation, it is conceivable that the intradermal palpebral mallein test is a more delicate one than the usual hypodermic injection of 1 c.c. of ordinary mallein in the neck, since in the latter test no reaction was given, whilst in the former test a definite reaction was obtained.

FRACTURE OF THE TIBIA.

By RICHARD JONES, M.R.C.VS.
(*Towyn.*)

The patient in this case was a 3-year-old draught filly.

On Thursday, December 28th, 1916, a strange horse was put in a stall on the off side of the filly overnight, and a small wound was noticed on the morrow.

She was left in the stable until Wednesday, January 3rd, and the owner thought she was well enough to work. She was taken out to plough, and did plough for a whole day.

On Thursday, January 4th, she was put to work the outside gearing to chaff, and before she had gone many rounds, displacement of the fractured bone took place. She was taken to the stable with difficulty. I was called to see her on January 5th. I found her down in a stall on the near side, unable to rise I had her turned over to the off so that I could have a better view of the fractured leg—the near hind.

I explained to the owner that nothing could be done, and that she had better be shot. To this he consented, so I shot her before leaving the premises.

Moral.—To sling such cases until there is proof that fracture without displacement has not taken place.

AN INTERESTING CASE OF SPURIOUS HERMAPHRODITISM.

By C. HAYWOOD, M.R.C.V.S.
Leicester.

WHILE examining a number of Army Remounts, I noticed that one, to all outward appearance a bay mare 16 hands, possessed an abnormally long vulva. On attempting to insert my hand into what I supposed was the vagina, I was unable to proceed more than a few inches as a blind sac was encountered. On everting the labiæ, I found on the floor of the "vagina" a small well-formed penis, a little more than 2 inches in length, with a Patent urethra and a fully-formed navicular fossa (see Fig. 1), surrounding which was an abundance of smegma.

Upon observation it was discovered that the animal micturated through this urethra; furthermore, when placed in close proximity to mares, the animal showed signs of sexual excitement, an erection of the penis with ejection of fluid taking place.

External examination revealed no sign of testicles. The teats and mammary glands are well developed—indeed, larger than those of an average maiden mare, and the teeth present the typical appearance of a gelding, showing particularly well developed tushes (see Fig. 2). The animal is very docile and a willing worker.

The accompanying illustrations have been made from photographs lent to me by the Officer Commanding the Depôt.

[Although commonly termed cases of "Hermaphroditism," these are really "arrested development."—EDITOR.]

A CASE OF EQUINE SCABIES IN THE MOUSE.

By THOMAS PARKER, F.R.C.V.S.
Veterinary Officer to the City and County of Newcastle-upon-Tyne.

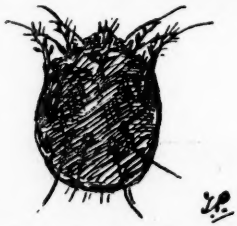
Whilst examining the last two horses concerning the outbreak just described* under (*c*) I observed a mouse running along the stable floor, making towards the door. Scabs could be plainly seen on its back and ears. With the assistance of the horsekeeper the little individual was secured and killed. The tail had been removed from within about ¼ inch of the sacral region, and the off hind limb was absent from the stifle downwards. The missing parts must have been severed for some considerable time, for the stump, in each case, was perfectly healed and exhibited no sign of any irritation. On each side of the back there was a lesion about ½ inch long, about ¼ inch broad, and almost oval in shape. The crusts, somewhat yellowish white in colour, and about ¼ inch thick, were slightly elevated, exposing blood-stained areas. the edges, particularly the lower and outer

* *Vide* previous clinical "Three Cases of Equine Sarcoptic Scabies in Man."

FIG. I.—Shewing Rudimentary Penis.

FIG. II.—Shewing Tushes.

parts, of each ear presented scabs also. On arrival at my office the crusts and deep scrapings were taken from the lesions of the back, and immersed in a 10 per cent. solution of caustic potash. The next morning a few slides were prepared and examined under a low power of the microscope. On two of these eggs were found exactly similar to those found in the specimens obtained from two of the horses. On another slide several parasites were found. One of these, after being separated from the surrounding debris and more carefully examined, was found to be an adult acarus having all the characteristics of the equine sarcopt. This outbreak appears to be unique in one particular, namely : That there is very strong evidence on the one hand that the disease was transmitted to man, whilst on the other there is positive evidence that it was transmitted to a mammal other than man, *e.g.*, a mouse. Apart from this most interesting feature, others of



Sarcopt. (equine) from the Mouse.

much more importance are illustrated, and therefore provide reasons for careful thought by those called upon to deal with outbreaks *e.g.* :—

(1) Does the probability of mice and, perhaps, rats or even cats being affected while living within infected stables, either temporarily or permanently, offer any explanation why in some cases recurrent attacks of the disease (as recorded by some observers) occur, notwithstanding most vigorous treatment of the animals and disinfection of the premises ?

(2) Is it not possible for these mammals (mice, etc.) to become hosts—even although only temporarily—for a period sufficiently long to enable them, after having migrated to neighbouring stables, to successfully convey the disease to other horses ?

Neumann's statement that there is no authority for stating that horse mange may be communicated to the sheep, goat, dog, etc., having regard to previous observations, might be considered rather interesting on the following grounds :—

(1) Dogs, and particularly sheep and goats, do not—in this country—commonly live in stables with horses.

(2) Mice are common to most stables.

STRUCK BY LIGHTNING.

By P. G. BOND, M.R.C.V.S.,
Plymouth.

THIS is not an unfrequent incident in a country practice.

Some time in last autumn a farmer client called upon me and stated as follows: "I had a heifer killed by lightning yesterday afternoon, and I want you to give me a certificate to that effect, as then I can claim from the Insurance Company. I have seen the agent, and he says I must get a veterinary surgeon's certificate as to the cause of death, and then the office will no doubt pay me."

This appeared to be a very convenient arrangement to the owner of the animal. My reply was: I must first see the carcase and, if necessary, make a microscopical examination of the blood, and make notes of the facts connected with the case. One thing I had to make sure of, had there been lightning recently in the district?

I visited the farm about noon next day; I could not attend before. The animal had been dead about forty-eight hours when I saw it. I found it in a field, lying on its side with the fore legs turned back under, the head protruding, rigid; no discharge of blood from the nose or rectum. The udder—it was a first time heifer in calf—small and pale pink in colour. In anthrax this is usually of a bluish-red colour, rather angry looking; a little froth from the mouth; body a little tympanitic, not prominent.

It was lying close to a ditch, and there were signs of the soil having been disturbed just round the spot where the carcase lay. In the same field there were ten others, and near by was a large beech tree shadowing that part of the field.

The weather was very hot with bright sunshine, and had been so for several days. On the afternoon and night prior to the animal being found dead there had been a very violent display of lightning—sheet lightning, very vivid and constantly repeated throughout the night. The suggested cause of death seemed feasible.

There were conditions that indicated possibly anthrax, malignant œdema, yew poisoning, or enteritis. I could not detect any anthrax bacilli in the blood from the ear, and when I made a *post-mortem* examination afterwards the spleen was normal, the rumen free from any yew or what could be called poisonous vegetable matter. The carcase on the whole presented the conditions similar to those exhibited in inflammatory œdema or a typical quarter ill.

When animals are killed by lightning, the death is so instantaneous that frequently the posture of the dead animal is the most remarkable feature. What is the diagnostic feature of death by lightning? The first case I met with in 1869, was that of twenty sheep killed.

They were all right before the storm; they were found dead after the storm. They were in different postures—some on their sides, some on their backs, some kneeling, some kneeling on one leg, others apparently feeding; no marks of fire on any of them; no trees very near. The Insurance Office, whilst not admitting liability, paid as an indemnity the sum of £3 a sheep to the owner. From this date other offices did likewise, and now it is a regular item included in a farm policy against loss of animal life as a result of fire.

Other cases where the animal has been grazing underneath a tree the lightning has run down the tree and struck the animal dead. In one case a horse was out in a thunderstorm in a carriage, one of a pair. The lightning so played round the steel bit that the horse became very excited, it could be held with great difficulty. It reached the stable yard, but, on being taken out of harness and put into its box, dropped dead.

In another case, that of a cow, it was found dead, with one foreleg stretched out, one foreleg bent back under; one hind leg straight back, one underneath the abdomen. The leg stretched out had a branch of a tree on it, broken, in my opinion, by the same force that killed the cow.

In another case the death was actually witnessed, and here the cow was under an elm tree. The tree was struck, and the effect shown from top to bottom. The cow was struck on the poll; the fire had apparently run down the neck as far as the withers, then turned to the left and run down the left fore limb into the ground. Of these cases there was no doubt as to the cause of death, it was evident enough; it is in the other cases where such prominent features are absent, where the difficulty of an accurate diagnosis comes in.

In another claim made on a company, I was asked to investigate and report. I felt doubtful, and to help me to decide, I applied to the Meteorological Office and found that no lightning of any kind, sheet or forked, had been recorded during the whole of the month in which the animal was said to have been struck. I did not give a certificate that the death of the animal was due to lightning stroke, and the claim fell through.

In appearance *post mortem* the animals do not, in my opinion, decompose very rapidly. The death is so instantaneous there is scarcely time for the decomposition to set in. The *ante mortem* changes in the tissues have not taken place. The eye presents an open kind of look, not that dull appearance usually shown in death.

In the first case mentioned, after obtaining all the evidence from the autopsy, and the history of the case, I gave a certificate that the animal was struck by lightning, which caused its death. There was

no other death at the farm, nor did any of the other ten show illness. I acted for both the owner and the insurance company. The company thanked me for my report and paid the claim without demur.

These cases come before us at times, and their explanation is not quite so easy as it appears.

CASTRATING ROPE.

RICHARD JONES, M.R.C.V.S. *Towyn.*

It occurred to me when operating on a 2½-year old "rig" in my yard that I would have my casting rope photographed. It is by far the best and most expeditious rope I have used or seen. A rope of this kind was given to me by a castrator in mid-Cardiganshire for allowing him to see a "rig" being chloroformed and operated upon. All veterinary surgeons and castrators who have seen it being used have been highly satisfied with it, and I have procured similar ropes for quite a large number.

Fig. 1.—Rope adjusted ready for Casting.

The photograph No. I shows the rope placed on the colt, ready for casting, and No. II shows the same thrown, tied, with sacks of straw packed on each side to keep the patient on his back during the operation. It will be seen in photograph No. II that the hind legs are not drawn too far forward, thus leaving inguinal region better exposed and more "get-at-able."

The tying with this rope is exceedingly expeditious. When

the colt goes down, the loose rope on each side is taken back inside the forelegs, passed round the hind pastern from outside in, and a loop with a half twist passed from outside underneath the hind leg and the forefoot inserted in it; the rope is then pulled tight. This is all the tying necessary to make the patient, whatever size he may be, absolutely secure.

It will be seen from the photograph that the pull is from the withers and the side of the neck, and in several instances I have known the rope to slip from the pastern up to the thigh when the hands in casting have been too weak to get the horse down at the first pull. To remedy this defect, I had rope hobbles made as follows, to be fixed to the hind pastern. I have a piece of roping long enough to

FIG. 2.—COLT TIED AND FIXED IN POSITION FOR CASTRATION.

go round the pastern, with a loop spliced on one end, and a brass eyelet spliced on to the other. The eyelet end is passed through the loop and the side ropes drawn through the eyelet to another eyelet on the side of the neck.

The other photographs may be of interest to your readers. They show a young cow suffering from traumatic pericarditis. I intended to operate, but she died more suddenly than I expected.

I am indebted to Miss Andrews and my daughter for the photographs.

FIGS. 3 AND 4.—COW SUFFERING FROM TRAUMATIC PERICARDITIS.
Case recorded by Mr. Richard Jones, M.R.C.V.S., Towyn.

"TIPS" ON CAMELS, FOR VETERINARY SURGEONS ON ACTIVE SERVICE.*

By A. S. LEESE, M.R.C.V.S.

(*Continued.*)

Diseases of Respiratory System.

Torn nostrils are almost confined to camels in which nose-pegs have been inserted; the condition occurs from repeated strain on the nose-rope, which is attached to the peg by string. It is therefore found to occur chiefly in sick or lame camels which have been made to work with others; in overloaded camels; and in badly driven strings of camels in hilly country. A septic condition of the nose-peg hole, which sometimes gets "fly-blown," predisposes to "torn nostril" and even a fatal phlebitis; this is common in Scinde, where blow-flies are active for a great part of the year, as there is no real cold weather. A campaign against the use of the nose-peg in riding-camels in Scinde might save a good many lives and certainly great suffering. It is doubtful whether the entire pack-camel of India could be managed without the nose-peg.

There is nothing special to note concerning treatment; but septic wounds about the nostrils should be thoroughly freed from necrosis and maggots and carefully dressed; the fatal phlebitis above referred to will be described under "Surgical Conditions of Head," and ends in meningitis.

Catarrh and *Bots* have already been referred to.

Fractures and *Ostitis of turbinated bones* cause nasal wheezing from narrowing of the meatus, and are sometimes curable by bold operation. Pus generally works out on to the face and guides one as to the seat of injury. The cause is a blow over the nose.

Laryngitis is a rare disease in camels; the veterinary surgeon should know that the common febrile diseases causing swelling in the region of the throat are pharyngitis from irritant plant-poisons, traumatic inflammation of the palatal expansion, and anthrax.

Bronchitis, Broncho-pneumonia, Croupous Pneumonia, Lung-abscess, and Pleurisy.

The course and treatment of all these diseases in camels resemble those of other large animals. Exposure to cold and wet predisposes to broncho-pneumonia, as also does debility from any cause; indeed, broncho-pneumonia finishes off many camels weakened by trypanosomiasis. Croupous pneumonia is met with as an apparently contagious disease in 4, 5, and 6 year olds. Pleurisy may accompany pneumonia; or it may be specific, caused by a bacterium of the fowl cholera type,

* For previous instalments, see page 79 (March), page 136 (April), and page 167 (May).

in weakened subjects. The specific lung diseases already described, such as verminous bronchitis, tuberculosis and pyæmia, must not be forgotten in diagnosis. Pneumonia sometimes arises from choking by medicinal draughts carelessly given, particularly oily ones.

The common sequels of pneumonia in camels are (i) lung-abscess and (ii) œdema of lungs. Lung-abscess is by far the most common cause of *chronic cough* in camels; the cough is most often noticed early in the morning, and also after rising from the sitting position. Camels with lung-abscess often have indifferent appetites and temperatures above normal; they gradually waste away, although death may not take place for months. It is a matter worthy of note that all known causes of chronic cough in camels are incurable (lung-abscess, chronic "dry" pleurisy, and tuberculosis); an emaciated camel that has had a chronic cough for two months can safely be destroyed. Grinding of the teeth, and grunting on rising, are sometimes indulged in by camels with lung-abscess; nasal discharge is generally absent. Many camels recover from pneumonia and pleuro-pneumonia. Œdema of the lungs is chiefly met with in camels which are the subjects of the acute form of trypanosomiasis. A chronic "dry" pleurisy with extensive adhesions, causing emaciation, occasional cough and irregular temperature, may supervene on an acute pleurisy.

Fractured ribs are common in camel-practice and may produce localised pleurisy; or may penetrate the lung. As regards the symptoms of the acute diseases of the chest, the camel shows the classical abnormalities in the respiratory movements extremely well; in health, the "thoracic" respiration is less marked than in the horse, the ribs of the camel being weight-bearing bones and less capable of movement; the "abdominal" respiration is more pronounced than in the horse. A soft sigh-like, cough; sitting inclined towards one side; absence of nasal discharge; are rather characteristic of pneumonia in camels. The painful stages of pleurisy are marked by frequent changes of attitude and grunting Œdema about the lower part of the chest and belly occurs when the heart is hard-pressed.

Treatment of the acute diseases of the chest follows the usual lines, the special points applying to camels being:—

(i) Examine the blood for co-incident trypanosomiasis.

(ii) Examine the ribs for fractures.

(iii) Never tie the sick camel down in the sitting position, as he prefers to stand most of the time and to change his position frequently.

(iv) Ammonium Carbonate, ʒ½ to ʒi in bolus, is a particularly effective drug in camels with pneumonia, probably, as I have said before, because of the great length of their trachea. Strychnine (up to 1½ grains hypodermically) is also very useful.

(v) Carefully attend to all the items mentioned in the section " Nursing of Sick Camels."

Hydatid cysts are present in the lungs of many camels, and a large number can be harboured without any inconvenience whatever. I have met with one case, however, slowly suffocated by having its lungs crammed with cysts ; the symptoms were emaciation and dyspnœa, unaccompanied by loss of appetite, abnormal temperature or cough ; and I have never met with this clinical " picture " in any other camel-disease.

Nodular disease of lungs is met with in *post-mortems*, and resembles the same condition in horses. It has no clinical importance.

DISEASES OF CIRCULATORY SYSTEM.

An irregularly intermittent pulse is sometimes met with in healthy camels. The only diseases which need be mentioned here are pericarditis, atrophy of heart, and anæmia (parasites of the blood have been dealt with). I believe that the sudden death so often noted in trypanosomiasis is due to thrombosis with embolism. A case of *Traumatic pericarditis* has recently been reported in the *Veterinary Record* ; it is very rare in camels, in spite of their prickly diet, and I have never seen a case.

Pericarditis, due evidently to a bacterium of the Hæmorrhagic Septicæmia type and accompanied by pleurisy, has been seen in a camel weakened by trypanosomiasis. The symptoms were the classical ones, and the pulse-beats were increased in number out of all proportion to the increase in respirations.

Atrophy of the heart. This, associated with extreme *anæmia*, is the common condition which makes it impossible to bring extremely emaciated camels back to health. The heart-wall is sometimes only ¼ inch thick, even in the left ventricle. The blood looks like claret and the muscles are all œdematous. Anæmia in a less severe form can often be cured, and the magic word " debility " should, in the case of camels, generally be dropped in favour of " anæmia." Treatment with iron compounds is beneficial in practice.

DISEASES OF DIGESTIVE SYSTEM.

Abnormalities of teeth. Among conditions affecting incisors and tushes, one may see " overshot," " undershot," and irregular direction of growth of incisors ; the two former are only serious if very marked and in grass-grazing breeds ; the latter is corrected by shearing those teeth which inconvenience the animal. Badly healed fractured lower jaw may necessitate the rounding-off of tushes to prevent injury to the palate, especially when the jaw heals with a " twist " to one side. Molar teeth are practically never affected with caries ; alveolar periostitis is very rare too, and the superior maxillary sinus, which is

extremely small is not, in my experience, liable to suffer from disease Overgrown grinders are treated as in the horse, but are much less common. The disease of molars in camels most often met with is an abnormal space between the first molar of the upper jaw and the premolar in front of it; in this space, twgis become lodged, and, by sticking out on either side, cause ulceration of palate, tongue or cheek, as the case may be. I have seen cases fired externally by camelmen under the impression that the swelling of the cheek was a "boil." Treatment consists in daily removal of twigs and food from the space. I have succeeded in preventing this accumulation of food for six months by packing the space with gutta-percha, but the gutta-percha must be at exactly the right consistency when applied, and the camel's mouth kept shut with a rope for at least half an hour after, so as to prevent him chewing the cud until the "stopping" has hardened.

INFLAMMATION OF PALATAL EXPANSION.

This is a condition peculiar to camels, and is generally traumatic, the palatal expansion of camels being exposed to bites of other camels when it is extruded from the mouth during fights between rutting males. There is complete inability to swallow food, with a large painful swelling in the region of the pharynx; sometimes there is a hard paroxysmal cough, and generally there are frequent swallowing movements. The head is extended on the neck (*i.e.*, nose is "poked out"). The condition must not be mistaken for anthrax or for irritant plant-poisoning; in anthrax, the swelling is largely subcutaneous and in injury to the palatal expansion it is palpably deep; in plant-poisoning, there is generally some vomition. One generally has a history of "rutting" to help in diagnosis; and an examination of the back of the mouth will enable it to be made; if the organ cannot be seen, it may often smell putrid, and a manual examination of the palatal expansion, made by means of a mouth-gag, reveals a large, hard, painful swelling in it. The best gag for this purpose is one made by wiring together four strong wooden bars thus ⋕

The palatal expansion, when wounded, shows a great tendency to chronic inflammation and indolent ulceration. Treatment consists in surgical removal of the greater part of the organ, including the diseased portion. This is done by extracting the organ as far as possible by hand and cutting it across at about the level of the first grinders. There is practically no hæmorrhage and little pain is involved in this amputation, and the camel is relieved instantaneously, requiring no further doctoring. It is possible that this operation may reduce the thirst-enduring power of the camel, but the disease will eventually prove fatal if this operation is not performed.

Pharyngitis is chiefly seen in irritant plant poisoning, and is usually accompanied by vomition. It must not be mistaken for anthrax.

Choking is frequent in greedy camels which bolt their grain ration. I have never seen a case which did not soon recover by either leaving it alone or administering, carefully, small draughts of water.

Parotiditis. I have met with one or two cases due to plugging of Stenson's duct at the buccal opening, which is easily located on a very large papilla inside the cheek. Treatment is as in other animals.

Vomiting. True vomition is seen in camels which are suffering either from impaction of third and fourth stomachs or from plant poisoning (oleander, datura, irgin, and many others), but it remains to find a drug which can produce it. In sick camels liable to vomit, the tissues of the under surface of the neck have a peculiar sagging appearance.

Tympanitis occurs in camels under similar circumstances as in cattle, and is treated in the same way. I have seldom found it necessary to use the trocar, because the camel can generally be cured by drugs, viz., linseed oil 1 quart, turpentine 1½ or 2 ozs., and ammon. carb. ½ to 1 oz. If poisoning is suspected, the amount of linseed oil should be 2 quarts. Tympanitis in camels sometimes supervenes on diaphragmatic pleurisy. If trocar and canula are used, they should be fine ones, not the clumsy cattle pattern. If left untreated, tympanitis finishes up in true apoplexy, and, once a camel has got thus far, I have not found that removal of the gas from the paunch will cure him. Impaction of the first stomach with food does not appear to be a disease of camels.

(*To be continued.*)

Translations.

MANGE AND THE AIR CURE.—ABSTRACT.

By M. BERTON,

Veterinary Surgeon, Chief of an Army Veterinary Service.

Putting aside for the moment all prophylaxis, the treatment of mange comprises a therapeutic and hygienic part.

A.—Clipping ought to be done in all cases, whatever be the intensity of the disease, or whether it consists only of a few cutaneous islets or extends to large surfaces. The mane is clipped; at the end of the tail a wisp of hair is left as a defence against very aggressive flies in summer and autumn. By this preliminary operation the skin surface is rid of gross impurities, and in a condition to receive with advantage soapy lavages and parasiticide applications. Clipping arouses cutaneous radiation, exaggerates respiratory combustions, and increases chemical action. It reawakens languid functions, and perhaps thus adds to the benefit of therapeutic action. But, whilst stimulating

organic action, it may bring about a decline of condition, an accentuation of leanness, if it is not compensated for by good feeding, the keeping of the patient for some days in the stable, with shelter from sudden thermic changes. After clipping, one must proceed to clean and scrape the skin in a way that is not indifferent to the early production of results. A hot solution of soft soap is first prepared, then applied progressively from the head to the tail, region by region, on all the tegumentary surface, with the aid of a spray or other appropriate apparatus. Beneath the fine spray the brush parts the hair and makes the soapy solution penetrate, whilst a helper, armed with a spatula—a fragment of hoop iron will do as well—scrapes the skin immediately after the brushing. To this first operation succeeds a fresh rinsing with pure warm water (not soapy), and renewed without interruption until the spatula only carries away liquid exempt from all impurities. Thus prepared, the skin is quite ready to profit largely from antipsoroptic applications, without it being submitted to the brutality that too often accompanies the current method of all good therapeutic scrubbing.

It has been stated that pomades, oils, and embrocations should be discarded, and the functions of the skin encouraged, and the spontaneous reaction of this initial defence counted on. One only seeks after a relative offensive in using antipsoroptics without waiting for the immediate and complete destruction of all acarian colonies. To attain this, limited and warm solution suffices—Polysulphate of potash in the proportion of 2 to 2½ per cent. gives excellent results.

A little tin box, holding one or two litres, pierced with a small hole on the lower part of the wall, is sufficient to water the entire surface of the integument. One assistant moves the tin about, whilst another spreads and rubs the warm antisporoptic solution into the skin with the naked hand. This operation, made with great care as well on the regions obviously ill as on those apparently healthy, takes up fifteen to twenty minutes. It is renewed three or four times at intervals of twenty-four hours, and during all this period of treatment the patient ought to be kept in the stable, receive the diet ordered (corn if possible, bran and linseed mashes, hay of good quality), and be watered at least three times a day.

B.—This first period of treatment ended, the horses are let loose, and put at liberty in the meadow day and night whatever be the season and inclemencies. The air cure finishes the recovery commenced, and, moreover, does it more surely than it can do without this preliminary help. It is hardly any use establishing categories of patients; the extent of the pasture, the length of time of treatment, is the only guide for the constitution of the lots. In the hygienic supervision afterwards there is no need to bother about the persistence (unless

exceptional) of a certain itchy state always without a morrow, the reaction to " scratching," which in the great majority of cases is without value, although its expression seems to-day for many practitioners to have a precise meaning, and to constitute an infallible diagnostic sign. (At the depot of S., a horse under treatment for mange for many months commenced to grimace at the appearance in its neighbourhood of the smock of the veterinary surgeon.) It is of the greatest importance that the pastures be traversed by a course of water that assures a permanent supply. For the special aim proposed—recovery from scabies—the quality of the pastures with regard to herbage has only a very relative value, it being necessary that the horses should receive their total ration of forage and corn; also, movable mangers must be provided to carry this out. A meadow of good quality, that can nourish two horses per hectare (about $2\frac{1}{4}$ acres) to the exclusion of all complement of hay and oats is capable by this plan of easily accommodating at least fifteen horses.

The site is still quite large enough to allow the patients sufficient exercise, indispensable to the good carrying out of all functions—above all, to the activity of heat generation related so closely to muscular work. This method of treatment, whilst suitable to large bodies of horses, is perfectly convenient for special depots which at certain periods serve as hospitals for a great number of sick animals. Simple, expedient, not requiring many attendants, it avoids overcrowding, and accommodates itself best of all to the actual necessities of war by producing the best results at the least cost. Doubtless it is nothing new; the medication noted is of old practice. Its originality consists in acting equally on the acarus and on the soil that harbours it. It has good physiological common-sense at the back of it, and through it the acarus finally is brought to account by its host.—*Revue Générale de Med. Vet.*

G. M.

[M. Berton first had his attention called to the value of the air treatment by the fact that twelve horses with all the clinical appearances of mange came up cured after two months at pasture without any medical treatment. Later on, ten out of twelve horses (three types of mange diagnosed by finding the mites) recovered in two months by the outdoor treatment, supplemented by good feeding and drink at will.]

THE USE OF SUGAR IN SURGICAL LESIONS OF THE FOOT OF HORSES.

By P. BIMBI.

The author supports the conclusions of Brussano on the absorbent, antiseptic, cicatrising, and antiputrescent qualities of finely powdered sugar. His observations show that sugar contributes to the rapid

cleansing of the wounds to which it is applied, it hinders the formation of pus, and assures prompt cicatrisation. Sugar acts quite particularly and very favourably on the regeneration of horny tissue. No substance among those which are regularly employed in the treatment of surgical affections of the foot (Socin's powder and paste, naphthalene, carbolised oil) is possessed of the same properties as sugar. Sugar acts markedly in favouring the repair of horn substance, whilst other substances act chiefly on soft tissues. By its use superabundant granulation is avoided and cure more rapidly obtained.—*Il moderno Zooiatro.*

DRAINAGE BY MEANS OF HORSE HAIR.

THE importance of good drainage to wounds is understood by all practising veterinary surgeons. P. Morel and V. le Page, writing in "Recueil de Méd. vétér. Bulletins," for 1916, discuss drainage by the use of horse-hair. The procedure is to pull out a few hairs from the horse's tail, and draw them through wounds, natural cavities, abscesses, etc., with a view to securing the carrying away of exudate. The hairs to be used are prepared by placing them in a strong, disinfecting solution of potassium permanganate, or creolin. Locks of four to ten hairs are drawn through the region with an iron needle, which any shoeing smith can make on the field, in such a way that the ends of the strands hang out at the entrance and exit of the opening. Several times each day the drainers are drawn to and fro. Two knee-joints, a wound on the withers, an abscess under the chest, a gall of the stifle, a cold abscess of the shoulder, a commencing quittor were drained in this way. In all the cases cure resulted in one to four weeks. The procedure is very simple, and is accompanied by little pain. The resulting scars are tractable, painless, and the animals are soon fit for work again.—*Swiss Veterinary Journal.* G.M.

Abstract.

THE PHYSICAL EXAMINATION OF DAIRY COWS.*

BY J. L. WILDER,
Akron, N.Y.

I HAVE not selected this subject with any thought of advancing some new or better method of examining cows for dairy production. My object is to try to arouse a discussion here that may lead to a better understanding as to what is a good, practical physical examination. I mean an examination that will eliminate those

* Read at the meeting of the Western New York Veterinary Medical Association, Buffalo, N.Y., December, 1916.

cows that are a menace to public health. I mean an examination that is a credit to the veterinary profession instead of being a joke. An examination that will cause the dairyman to feel a sense of satisfaction regarding the health of his herd, instead of having a feeling of being imposed upon by the health department and the veterinary profession.

When called by the dairyman to examine his cows—and I believe no veterinarian who is true to his profession will go to a stable until called—I do not believe in making false motions simply to cause an impression, but go about the examination in a practical, professional manner.

There can be no rule as to what to do first or what last, but I think each man should decide on a system of his own, and then adhere to that as nearly as possible.

I am going to describe as nearly as I can my own mode of procedure, not because I think it is better than any other, but it is the easiest way I can explain what I consider a fair and practical physical examination.

First, I auscultate the lungs carefully and percuss wherever auscultation reveals any sound not entirely satisfactory. Second, I manipulate the lymphatic glands in the pectoral region and those of the flank, and I regard with suspicion those that are hard and knotty or sensitive. Third, I examine the udder, drawing a little milk from each teat into the hand. Fourth, I examine the head for actinomycosis, and manipulate the submaxillary and parotid glands. Following this I look for vaginal discharges or any suppurating wounds on the body.

Possibly this examination, that I have described, may not fully satisfy the health authorities of the State Health Department, but I think an examination similar to that described will eliminate a large percentage of the cows that are dangerous to the public health, if their raw products were used.

My experience of the past two years, although rather limited, has convinced me that an examination of this kind, made by a veterinarian called by the owner of the herd to make the examination inspires respect for that veterinarian and his profession. It does more than that: In a greater or less degree it removes the feeling that the milk producers are being oppressed unjustly by the health department.

On the other hand, the veterinarian who goes into a dairy section, and goes from farm to farm asking the privilege of examining the cows, explaining the advantage of having it done then, because he is in that locality and can do it cheaper than it can be done

at any other time, is putting veterinary services on the bargain counter. Such methods are not only unethical, but are professionally dishonourable; they brand the veterinarian as a *grafter*, and aid in widening the gulf between the health department and the milk producer.—*Jour. of Amer. Vet. Med. Assoc.*

Reviews.

VETERINARY REGISTER, 1917; price 3s. 6d. net.

The 1917 issue of the Register of the Royal College of Veterinary Surgeons is well up to date in all matters of interest to the profession. It is well compiled and arranged, and, although on the same lines as carried out in recent years, each issue appears to have some new and important features. The chief noticeable feature in the present volume is the number of members of the profession who are now holding military rank and doing their duty to their country in the Army Veterinary Corps. It is another instance of how each department can, if it sets its mind to it, become transformed rapidly, and in a very short space of time, from the quiet ways of peace to the violence of war.

The Register is a book which every veterinary surgeon should possess as a work of reference, and the energetic Secretary of the Royal College of Veterinary Surgeons is to be congratulated on the large amount of useful knowledge he has collected and condensed in its 458 pages.

VETERINARY BACTERIOLOGY.—A treatise on the Bacteria, Yeasts, Molds and Protozoa pathogenic for Domestic Animals. By Robert Earle Buchanan, Ph.D., and Charles Murray, B.Sc.D.V.M. Second edition; thoroughly revised. Published by Saunders Company, London and Philadelphia, 1916; price 15s. net.

This book, written and compiled by the two above-named professors at the Iowa State Veterinary College, is a useful one for veterinary bacteriologists and practitioners. It deals with the pathogenic bacteria, yeasts, molds and protozoa, and includes a section on "Bacteria and the resistance of the animal body to disease." There is a handy section on "Laboratory methods and technique," and a short one (all too short in our opinion) on the "Bacteria of water and food." Much more might have been written as regards "Milk: its constituents, contamination and examination," and this would have rendered the work far more valuable, to the British veterinarian at any rate.

The sixth section, which discusses "Infectious diseases in which the specific cause is not certainly known," is very instructive, comprehensive, and exact. It is instructive because it puts before the veterinarian a vast field of uncertainty (showing what need there is for research and investigation) as to the cause of many diseases; and it is exact (as far as it goes) because it acknowledges that the specific micro-organisms originating such affections as foot-and-mouth, rinderpest, hog and chicken cholera, pleuro-pneumonia, etc., are unknown, Many bacteriologists tell us that some of these specific bacteria are

known, but almost every individual country seems to have its fancy in the matter, and when each makes a claim, what can the neutrals do, if they are honest, but leave the matter in doubt? We think that the organism causing braxy in sheep might have been left uncertain, too; but the authors give it definitely as the "bacillus gastromycosis ovis." They omit consideration of the bacilli of "scrapie," "trembling" in sheep, and "louping ill," altogether, perhaps because these diseases do not exist in America, or else their origin is still at the "back of the beyond" as far as bacteriologists are concerned. Some men in this country believe that they have discovered the organisms causing these diseases, but then there seems to be no finality even to scientific discoveries. We have always considered that there is a lack of useful, serviceable text-books for the veterinary bacteriologist here. This book will help to fill a gap, and will be a valuable volume of reference to the investigator and conductor of research. It deserves a welcome place on the bookshelves of up-to-date veterinary practitioners, those engaged in corporation, county, or government service and it will be found equally useful and valuable in the sanctorum of Medical Officers of Health.—G. M.

THE PATHOLOGY AND DIFFERENTIAL DIAGNOSIS OF INFECTIOUS DISEASES OF ANIMALS. By Veranus Alva Moore, B.S., M.D., V.M.D., Dean of the New York State Veterinary College, Cornell University. Fourth Edition; 1916; pp. xvi+593; illustrations in text, 120. Publishers: The Macmillan Co., New York and London; price 17s. net.

This standard American text-book has gone into its fourth edition, and the present volume has been revised, added to, and in parts re-written Fresh matter in the work comprises a statement of the requirements for the inter-state shipment of live stock, and the Federal regulations for the veterinary inspection of meat. To the clinician the relation between symptoms in life and lesions found on *post-mortem* is of quite first rate interest and importance, and the study of comparative pathology is advanced considerably by the author of this text-book. The letterpress of the book is clear, concise, and well divided, and each disease has a few literary references appended to it, to enable the student to go further into a study of its cause and morbid anatomy, and to become acquainted with the results of original research in a few instances. Two of the most useful chapters in the book for British veterinarians will be those on "Infectious Abortion in Cattle" and "Hog Cholera." Full instructions are given as to the use of serum in swine fever. In the chapter on foot-and-mouth disease, where the question of differential diagnosis comes in, we think the author might have made his lines more valuable if he had referred shortly to the conditions that may be mistaken for epizootic aphthæ and given a description of them. As time goes on stomatitis of different kinds seems to be cropping up in new forms, and as a result we hardly believe to-day that the words, "The most difficult lesions to distinguish between are certain more or less pigmented depressions due to traumatism and foot-and-mouth disease lesions rather late in their course" are quite up-to-date. The range of the subject matter

of the volume is to the full extent of present day knowledge of infectious diseases, and protozoal no less than bacterial infections are discussed and explained.

Evidently, whatever may be the case in Britain, equine contagious pleuro-pneumonia is a well recognised disease in America, where fatalities may vary from 1 to 30 per cent. The chapters on "Immunity and Protective Inoculation" and on "Disinfection" are not the least noteworthy in the book. As regards the latter, it is curious that, almost without exception, authors when dilating on disinfection and disinfectants never mention or lay stress on one suitable for using in cow-houses, milk rooms and dairies, and yet a disinfectant for these places must possess special attributes and properties in order to be suitable and effective. The volume is well bound and illustrated. Practitioners, students, teachers, medical officers of health and meat inspectors may all study the book with profit and advantage.—G. M.

ANNUAL REPORT OF THE PUNJAB VETERINARY COLLEGE, CIVIL VETERINARY DEPARTMENT, PUNJAB, AND THE GOVERNMENT CATTLE FARM, HISSAR, FOR THE YEAR 1915-1916. Printed by Superintendent, Government Printing, Lahore. Price 9d.

Colonel H. T. Pease, C.I.E., has continued to act as Principal of the College, and Colonel Farmer as Chief Superintendent of the Civil Veterinary Department. There are now two separate courses at the College, a three years' one for military students, and a four years' course for native students. A post-graduate course has also been instituted to give advanced instruction in laboratory work, and contagious diseases, parasitology, and clinical diagnostics. The lack of a text-book in the vernacular hampered this teaching somewhat. Sixty-one students passed their first examination, 56 their second, and 49 their third. The illness and retirement of Mr. Gaiger handicapped the laboratory instruction. He was a capable member of the staff, and a reliable authority on Indian diseases. A new College was opened by His Excellency the Viceroy in December last, but a proposed new hostel for the students has been temporarily held up. The demand for graduates is far greater than the supply. The Principal is a strong advocate for a second vernacular Veterinary College in Northern India, and a better organisation of the veterinary services in order to turn out more well equipped veterinarians to cope with the work that is crying out to be done.

In the Civil Veterinary Department there were five chief members of staff, together with veterinary assistants who dealt with the treatment of contagious and other diseases, conducted operations, and took records of the breeding activities. The number of castrations was doubled, and cattle breeding showed gratifying increase, four new breeding farms being established.

Owing to shortage of water and insufficient canal supply, the Hissar Cattle Farm had a difficult year, but nevertheless, Mr. Branford and his staff did good work. Owing to the absence of rainfall, grasshoppers and crickets flourished, and did much damage. The Report can be obtained through Messrs. Constable & Co., 10, Orange Street, Leicester Square, W.C., or H. S. King & Co., 65, Cornhill, E.C.—G.M.

ANNUAL REPORT OF THE CIVIL VETERINARY DEPARTMENT, BIHAR AND ORISSA, FOR THE YEAR 1915–1916. Price 8d.

This Report, drawn up by Mr. D. Quinlan, M.R.C.V.S., is another record of valuable work done in a vast field. There is an increasing demand for veterinary assistants, and the service needs to be made more attractive in order to gain the necessary men to cope with disease. The reporting of scheduled diseases and the carrying out of inoculations occupy the constant attention of the Department, but the natives are prejudiced against the former, and in many cases resent the latter.

Itinerary veterinary assistants and veterinary assistants in charge of hospitals did good work, the former treating 54,904 new cases, and the latter 26,213. Shoeing forges did well and showed a profit in spite of the high prices of nails and iron. The two bull-breeding farms just about held their own, but the demand for bulls for improving local breeds was greater than the supply. Much pathological material was sent to the Raymond Research Laboratory for examination. The Report is on sale at Messrs. Constable's, Leicester Square, and H. S. King & Co., Cornhill.

Obituary.

THE LATE CAPTAIN H. ANTHONY, A.V.C.

Friends of Captain Anthony will be sorry to read that he has been killed whilst on active service on the Western Front.

As Officer Commanding a Veterinary Mobile Section his duties took him close behind the firing line, and one night in May he was the victim of an aeroplane bomb which fell near his tent and killed him instantly.

He was a graduate of the London College, from which he passed out in 1901. Joining up as a Territorial when the war commenced, he had proved himself a most capable and trustworthy officer, and his death has robbed the Service of one of its best young men, whilst his loss will be felt deeply by a large circle of friends with whom he was deservedly popular.

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